IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: DAVID HUGHES HORNE

SERIAL NO.: 10/809,989

FILED: March 26, 2004

FOR: PROCESS FOR INCREASING STRENGTH, FLEXIBILITY AND FATIGUE LIFE OF METALS

GROUP ART UNIT: 1765

EXAMINER: ANITA KAREN ALANKO

AFFIDAVIT

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

Comes now David Hughes Horne, the inventor of the above-entitled invention for the application identified in Serial No. 10/809,989, and responds as follows:

COMMENTS ON THE APPLICABILITY OF PRIOR ART established by U.S. Patent 2002/0077004 A1, filed Dec. 18, 2000, by Wallace C. Lawrence, Durham, NC (US) titled, "SEPARABLE ELECTRICAL CONTACTS HAVING NON-NOBLE METALLIC ELEMENTS WITH SPECIALIZED SURFACE TREATMENTS FOR HIGH RELIABILITY SIGNAL APPLICATIONS."

1. The patent examiner stated that Lawrence's art in the above-cited patent anticipates the novelty of Claim 3 of David Hughes Horne's U.S. Patent Application No. 10/809,989, "Process for Increasing Strength, Flexibility and Fatigue Life of Metals."

2. Lawrence's art employs a known thin liquid, water displacing, corrosion preventive compound (CPC) meeting the requirements of MIL-C-81309E or MIL-L-87177A, Amendment 1 on electrical connector contacts to prevent or mitigate galvanic (dissimilar metals) corrosion. Mil Spec hard gold-plated contacts are plated with nickel over the copper base to provide a base to which the gold plating will adhere. However, the gold plating is known to have "holidays" or "holes" through which the gold and nickel can "see" each other and react as dissimilar metals in which the gold corrodes the nickel. The ability of the electrical circuits, in which the CPC treated connectors are a part, to transmit analog and digital signals or voltage and current, in electrical circuits, must be maintained at a high level of reliability. The resistance between contacts need to be maintained at less than about 5-milliohms, but gold to gold connector contacts within a few months on aircraft can have resistances greater than 50-milliohms within a year if the connector is not treated with a good CPC.

3. The Horne application suggests the use of an excellent CPC for a very different purpose than the art claimed by Lawrence.

4. The excellence of the corrosion preventive compounds to prevent galvanic corrosion between the nickel plating and the gold plating, between which are holidays, that keep the resistances across electrical contacts small does not infer that it will have any effect on the strength, flexibility, or fatigue resistance of metals. If knowing the existence of a CPC were all one needed to know to recognize that it could improve metal strength, flexibility, and fatigue life, some of the hundreds of CPC manufacturers and millions of CPC users of in the last 75-years, in which CPCs have been manufactured, would have begun treating metals using it long ago. But that has not happened. Numerous instances

of the CPC use are known where electrical contacts were treated to prevent dissimilar metal corrosion, which if not protected eventually could lead to circuit failures. But none of such uses are known to have been cited for improving the fatigue life, flexibility, and strength of the metal. It simply is not obvious even to an expert in the technology of either corrosion control or metals technologies, and there are many thousands of experts in metals technologies and corrosion control.

5. Completely unrelated to the electrical connector CPC treatment, it was not until the inventor struck on the idea to etch metal to reduce stress concentrations that he then saw the need of a CPC to protect the metal bonds after etching (during atom to atom bond stretching that causes high bond potential energy storage due to tension, compression, or shear stresses). Battelle fatigue research showed aircraft aluminum treated only with CPCs resulted in as much as 200 times increased fatigue life in 2024T6, and the MIL-L-87177 treated dog-bones resulted in the longest fatigue life. However, the synergistic effect of an etch and CPC is expected to make greater improvements. Thus, the excellence of a CPC in connectors didn't anticipate the novelty of treating metals to increase the strength, flexibility, and fatigue life in comparison with untreated parts.

6. The Horne U.S. Patent Application recommended MIL-L-87177 as a known excellent CPC but didn't specify any specific CPC use. Instead, Horne provided parameters with some levels that would be expected to provide the corrosion preventive ability to protect the metal to metal bonds. But the use of a proper etch for the metal with an excellent CPC to synergistically enhance the stated metal properties is a significant improvement on the present art.

David H. Horne, Chemical Engineer, Registered Professional Engineer

David Hughes Horne

Subscribed and sworn to before me this 26th day of May, 2006.

Notary Public
Residing in Salt Lake City, Utah